for killing weeds with chlorates. It is not unreasonable that this may have been associated, particularly in the spring, with the low nitrate content of the soil. The authors concluded that the nitrate effects on the toxicity of the chlorates seemed to outweigh the concentration effects resulting from different moisture-holding capacities which are associated with soils of different texture.

CENTIPEDE GRASS LAWN FROM SEED

In connection with experiments concerned with improving the germination of seed of southern grasses, G. W. Burton considered the possibility of getting a centipede grass lawn from seed. An attempt was made to harvest a small quantity of seed to be used in the experimental seeding of a lawn. Five pounds of seed were harvested, cleaned, and threshed at a cost of 40 cents a pound. Samples of the seed were then scarified by treatment with 50 percent hydrochloric acid and 35 percent sodium hydroxide for 5- and 10-minute periods, with the result that germination at the end of 40 days was increased from 26 to about 35 percent by all of the treatments except the 10-minute exposure to sodium hydroxide. The 5-minute treatment with hydrochloric acid apparently gave the best results after 20 days, which was a 10 percent germination, as compared with 3 percent in the untreated seed.

On February 22, 1938, the 5 pounds of centipede grass seed, two-thirds of which had been scarified in 50 percent hydrochloric acid for 5 minutes, were used to seed 10,000 square feet of lawn surface at Tifton, Ga. From this seeding a satisfactory stand of grass was obtained, which was able to compete favorably with crabgrass and other annuals during the summer of 1938, although this was the driest season on record at Tifton.

These results were published in the Journal of the American Society of Agronomy along with studies of scarification of seed of other grasses, including Bahia grass, Dallis grass, Bermuda grass, Vasey grass, and carpet grass. A 5-minute treatment in concentrated hydrochloric acid increased germination of Bermuda grass seed. However, even after this treatment only 20 percent of the seed had germinated at the end of 50 days, as compared with 13 percent in the untreated seed. Seed of carpet grass germinated 74 percent after 32 days without scarification, and all scarification treatments seriously reduced the germination.

It will be noted that the germination of the untreated Bermuda grass seed was particularly low, indicating that the seed used was a low grade or that the conditions provided in the test were unfavorable for germination. The tests were made in flats in the greenhouse in October at a mean temperature of 70°, which is too low for good germination of Bermuda grass seed. Tests made on good commercial seed in the Department of Agriculture at the alternating temperatures, 68° and 95°, have given germination percentages varying from 85 to 95 percent, depending on the sample. Perhaps had the germination tests with seed of Bermuda grass and centipede grass been made under more favorable temperature conditions, the results might have been higher both for scarified and unscarified seed.

ACTIVATED SLUDGE AS A SOURCE OF MINOR NUTRIENT ELEMENTS

In recent years, it has been shown conclusively that certain elements such as boron, copper, zinc, and manganese, in very small quantities are essential for the growth of plants. These and certain other elements are known collectively as the minor elements. Because of the very small quantities of these elements which are necessary for the proper growth of plants, they are usually present in soils in sufficient quantities or are added as impurities accompanying the crude salts in the fertilizers which are used.

There have been cases, particularly in the very sandy soils of the southeastern states, however, where striking benefits have been reported as a result of the use of boron, copper, manganese and zinc. In these same areas, the use of Milorganite which is the dried activated sludge from the Milwaukee Sewage Disposal Plant, has apparently resulted in benefits from constituents of the sludge other than the nitrogen, phosphoric acid and potash. It was felt that perhaps the presence of the minor elements might have been responsible for at least part of these benefits.

For this reason, C. J. Rehling and Emil Truog in the University of Wisconsin conducted experiments with Milorganite which have been described in a recent issue of the Journal of the American Society of Agronomy and in an earlier paper in the Analytical Edition of the Journal of Industrial and Engineering Chemistry. In the earlier paper they demonstrated by analysis of Milorganite that it contains 23 elements. Among these were boron, copper, manganese, and zinc, significant